CLAIMS (Clean)

What is claimed is:

1.   A method for estimating end-to-end quality of service parameters for

services for [[a]] an Internet Protocol ("IP") communications network, wherein the end-

to-end quality of service parameters are selected from end-to-end packet loss, end-to-end

packet delay and end-to-end packet delay jitter, and wherein the IP communications

5   network includes routers connected by network links and gateways between a Public

Switched Telephone Network ("PSTN") and the routers, the method using estimates of

offered traffic for each of the services service from each of a plurality of sources source

carried to each gateway of the IP communications network, the method comprising the

steps of:

10   determining a possible number N of sources where N is an integer greater than

one;

        estimating, from the offered traffic to each gateway, blocked traffic and carried

traffic from each gateway;

        estimating the carried traffic for each network link using a network routing

15 algorithm;

        calculating a plurality of loss probabilities by varying the number N for each

calculation; and

        estimating an end-to-end packet loss probability by summing the plurality of loss

probabilities from the calculating step.

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2.   The method of claim 1, wherein the plurality of loss probabilities is calculated over all possible values of N, and wherein the step of estimating an end-to-end packet loss probability sums the plurality of loss probabilities over all possible values of N.

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3.   The method of claim 1 further comprising the step of estimating the a single link packet delay distribution after the step of estimating the carried traffic for each network link.

4.   The method of claim 1 further comprising the step of estimating -an end-to-end packet delay distribution.

5.   The method of claim 1 further comprising the step of estimating the end-to-end packet delay jitter.

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6.   The method of claim 1 wherein the offered traffic for each of the services service has deterministic and non-deterministic attributes for packet length and inter-arrival distribution.

7.   The method of claim 1 wherein a Kaufman algorithm is used in the step of estimating blocked traffic and carried traffic.

8.   The method of claim 1 wherein the step of estimating end-to-end packet loss probability includes estimating a single link packet loss probability for each link.

9.   The method of claim 1, wherein the estimates of offered traffic are in Erlangs.

10.   A method for estimating end-to-end quality of service parameters of services for [[a]] an Internet Protocol ("IP") communications network, wherein the end-to-end quality of service parameters are selected from end-to-end packet loss, end-to-end packet delay and end-to-end packet delay jitter, and wherein the IP communications

5   network includes routers connected by links and gateways between a Public Switched Telephone Network ("PSTN") and the interconnected routers, the method using estimates of offered traffic having deterministic and non-deterministic attributes for packet length and inter-arrival distribution for each of the services service from each of a varying number of sources carried to each gateway of the IP communications network, the

10   method comprising the steps of:

determining a possibly possible number N of sources where N is an integer greater than one;

estimating, from the offered traffic to each gateway, a blocked traffic and a carried traffic from each gateway;

15   estimating the carried traffic for each network link using a network routing algorithm;

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estimating a single link packet loss probability for each link;

calculating a plurality of loss probabilities by varying the number N for each

calculation;

20   estimating an end-to-end packet loss probability by summing the plurality of loss

probabilities;

estimating ~~the~~ a single link packet delay distribution;

estimating ~~the~~ an end-to-end packet delay distribution; and

estimating the end-to-end packet delay jitter.

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11.   The method of claim 10, wherein the plurality of loss probabilities is

calculated over all possible values of N, and wherein the step of estimating an end-to-end

packet loss probability sums the plurality of loss probabilities over all possible values of

N.

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12.   A method for estimating end-to-end quality of service parameters of

services for [[a]] an Internet Protocol ("IP") communications network, wherein the end-

to-end quality of service parameters are selected from end-to-end packet loss, end-to-end

packet delay and end-to-end packet delay jitter, and wherein the IP communications

5   network includes routers connected by network links and gateways between a Public

Switched Telephone Network ("PSTN") and the routers, the method, using estimates of

offered traffic for each of the services ~~service~~ from each of a plurality of sources ~~source~~

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carried to each gateway of the IP communications network, <u>the method</u> comprising the

steps of:

10   determining a possible number N of sources <u>where N is an integer greater than</u>

<u>one</u>;

            estimating, from the offered traffic to each gateway, a blocked traffic and a

carried traffic from each gateway;

            estimating <u>the</u> carried traffic for each network link using a network routing

15   algorithm;

            calculating at least one quality of service parameter for each network link by

varying the number N for each calculation; and

            estimating at least one <u>of the</u> end-to-end quality of service <u>parameters</u> by

summing ~~the~~ quality of service characteristics for the network links.

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            13.   The method of claim 12, wherein the quality of service ~~characteristic~~

<u>characteristics</u> for the network ~~link is~~ <u>links are</u> selected from the group consisting of

single link packet loss probability and single link packet delay distribution. .

            14.   The method of claim 12, wherein the ~~end-to-end~~ quality of service

~~characteristic is~~ <u>characteristics are</u> selected from the group consisting of end-to-end

packet loss probability, end-to-end packet delay distribution, and <u>the</u> end-to-end packet

delay jitter.

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15.   The method of claim 14, wherein the quality of service ~~characteristic~~ characteristics for the network link [[is]] are selected from the group consisting of single link packet loss probability and single link packet delay distribution.

16.   The method of claim 12, wherein the estimates of offered traffic are in Erlangs.

17.   A system for estimating end-to-end quality of service parameters of services for [[a]] an Internet Protocol ("IP") communications network, wherein the end-to-end quality of service parameters are selected from end-to-end packet loss, end-to-end packet delay and end-to-end packet delay jitter, and wherein the IP communications

5   network includes routers connected by links and gateways between a Public Switched Telephone Network ("PSTN") and the routers, the system, using estimates in Erlang, of offered traffic for each of the services ~~service~~ from each of a varying number of sources ~~source~~ carried to each gateway of the Internet Protocol communications network, the system comprising:

10   a database comprising parameters for each gateway, the parameters identifying type ~~of service~~ and characteristics of each service;

         a memory comprising an end-to-end quality of service program; and

         a processor utilizing the end-to-end quality of service program to

              determine a possible number N of sources where N is an integer greater

15   than one;

estimate, from the offered traffic to each gateway, a blocked traffic and a

carried traffic from each gateway;

estimate carried traffic for each ~~network~~ link using a network routing

algorithm;

20   calculate a plurality of loss probabilities by varying the number N for each

calculation; and

estimate an end-to-end packet loss probability by summing the plurality of

loss probabilities.

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